PATENT SPECIFICATION

625,698

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PROVISIONAL SPECIFICATION

A Device for Supplying a Measured Quantity of Liquid

We, SYDNEY EWART BULLOCK, of M/V Nial, Galmpton Shipyard, Galmpton-on-the-Dart, near Brixham, Devon, WILLIAM EDWARD KENDRICK, of "Glendene", Windmill Lane, Alton, Hants, and THOMAS HAMILTON FAULKNER, of 21, Wrayfield Road, North Cheam, Surrey, all British Subjects, do hereby declare the nature of this invention to be as follows:—

This invention relates to a device for supplying a measured quantity of liquid and is an improvement in or modification of the invention disclosed in our co-pending Patent Application No. 19597/46.

In the specification accompanying our said co-pending application we have described and claimed a device for connection to a supply of liquid under pressure for the purpose of supplying a measured quantity of the liquid, wherein the pressure of the supply is utilised to fill a chamber of pre-determined capacity, to transfer this measured quantity into a transfer chamber, and to deliver it from the transfer chamber through an outlet or nozzle. The device comprises, *inter alia*, an annular chamber, a piston in the annular chamber adapted to reciprocate therein under pressure from the fluid to be delivered, a valve sleeve axially disposed in the annular chamber, a tubular valve structure within the valve sleeve for providing communication between the supply and the annular chamber and between the annular chamber and the interior of the valve sleeve, which in the particular form described acts as a transfer chamber, and means for regulating the rate of delivery of the fluid discharged from the device.

Objects of the present invention are to simplify the tubular valve structure and the means for regulating the rate of delivery of the discharge.

Further objects of the invention are to provide means for ensuring that the measured quantity is always fully delivered to the customer and to provide a visual indication of the quantity delivered.

With these objects in view according to the present invention the tubular valve structure is modified in such a way as to transfer the liquid in the annular chamber into the interior of the valve structure which in this modified form thus constitutes the transfer chamber.

The valve structure may be formed with conical or tapered ends in which the necessary inlet and exhaust ports and passages are provided.

According to a further modification of the present invention the delivery of liquid from the device is controlled by a sleeve actuated by a spring pressed lever, which may be remote from the operating handle.

According to a further modification of the invention means are incorporated for ensuring that the full measured quantity is delivered each time the valve is operated. Such a means may comprise a pivoted locking lever arranged to engage part of the valve structure during delivery so as to prevent further rotation thereof until the measured quantity has been delivered.

A further modification according to the present invention consists in the provision of a meter actuated by the piston in the annular chamber to give a visual indication of the measured quantity of liquid delivered.

In one way of carrying the present invention into effect the device comprises as previously a cylindrical shell-like casing, a front nozzle part, a valve sleeve disposed axially in the casing, a piston arranged to reciprocate in the annular chamber between the sleeve and casing, a tubular valve structure disposed axially inside the sleeve, and a handle at the end of the casing for rotating the valve structure to bring valve ports therein into and out of alignment with ports in the sleeve.

According to one modification of the present invention the tubular valve

[*Price 2/-*]

structure comprises an intermediate cylindrical portion having a conical valve at each end fitting into and forming a fluid-tight joint with a sleeve having a corresponding internal taper the two sleeves being suitably fitted into each end of the main valve sleeve. The conical valve adjacent the nozzle end of the device is formed with inlet and exhaust passages for the fluid to be delivered. The conical valve adjacent the handle end of the device is similarly formed with inlet and exhaust passages, and, additionally, with a passage branching from the inlet passage and communicating with an annular chamber (hereafter referred to as the "sleeve chamber") formed between the cylindrical portion of the tubular valve and the inner surface of the valve sleeve. The radial angle between the ports of the inlet and outlet passages of each conical valve is 120°, the inlet port in one valve being in longitudinal alignment with the exhaust port of the other valve. The valve sleeve has a port at each end, and the valve structure is connected to a handle whereby it can be rotated through 120° so as alternately to bring the aligned inlet and exhaust ports of the two valves into radial alignment respectively with the two ports in the valve sleeve. A tubular connection to a flexible supply hose is incorporated in the handle, the supply hose being connected to a supply of liquid, e.g. lubricating oil, under pressure, for example contained in a storage tank in a cellar or basement.

The operation is as follows. Assuming the conical valve at the handle end has its inlet passage aligned with the corresponding port in the sleeve, the other valve will have its exhaust passage aligned with the port in the other end of the sleeve, and the piston in the annular chamber will be at the handle end of its stroke. Incoming liquid from the supply hose will simultaneously fill the sleeve chamber and pass into the annular chamber behind the piston, forcing the latter forwards and thereby transferring the liquid in the annular chamber in front of the piston through the exhaust passage in the second valve into the interior of the valve structure (which thus becomes the transfer chamber) whence it passes through the outlet nozzle as will be described hereafter. When it is desired to make a subsequent delivery the handle is turned through 120° to reverse the valves, whereupon pressure fluid now passes through the branch passage in the one valve into the sleeve chamber, and through the inlet passage in the other valve into the annular chamber in front of the piston, pressing the latter back and exhausting liquid through the open exhaust passage again into the interior of the valve structure.

The chamber referred to above as the sleeve chamber is that referred to in the above-mentioned patent specification as the "transfer chamber". In the improved arrangement described the liquid is transferred from the annular chamber to the interior of the valve structure which thus becomes the transfer chamber. The sleeve chamber now forms part of the supply to the one valve, and in addition serves to equalise pressure on the facing ends of the two conical valves.

During each delivery the fluid issues from the interior of the valve structure in front of a piston controlling a piston-valve, the general construction of which is similar to that described in the parent specification. However, as described in the parent specification the rate of delivery could be controlled by a throttling disc which was rotatable by the handle. According to a further modification of the present invention this throttling disc is replaced by an arrangement which comprises a spring-pressed sleeve arranged normally to cover completely or partly a series of outlet apertures arranged in the wall of the nozzle around and immediately adjacent the face of the piston valve. A pivoted operating lever is connected to the sleeve, the arrangement being such that depression of the lever withdraws the sleeve against the action of its spring to uncover more or less the outlet apertures. If desired the arrangement may be such that the sleeve can never completely close the outlet apertures. In this modified arrangement liquid from the interior of the valve structure, i.e. from the transfer chamber, passes through a series of slots or ports in a flange surrounding the piston actuating the piston valve and along the inner wall of the nozzle casing into a chamber in which the control sleeve is disposed. Pressure is built up in front of the piston by this restricted flow and the piston valve is operated as described in the parent specification but as will be understood the delivery from the nozzle when the piston valve is withdrawn to open the nozzle outlet is controlled by the sleeve.

A further modification according to the present invention consists in providing means for ensuring that the correct measured quantity is delivered. To this end one end of a pivoted bell-crank lever is connected to an axial extension of the controlling piston in the outlet nozzle and is arranged so that its free end when

the piston moves forward under the built-up pressure enters a slot in the adjacent valve thus preventing rotation of the latter to re-set the valve passages until the built-up pressure drops, which only takes place when the full measured quantity has been delivered.

According to a further modification the device may incorporate a meter to give a visual indication of the quantity delivered. A suitable means for actuating the meter comprises bell-crank levers mounted so as to project into opposite ends of the annulaar chamber. One or other of these bell-crank levers is actuated by the piston as it reaches the end of its stroke and in turn actuates a sliding block carrying a pivoted pawl arranged to engage a ratchet wheel, the arrangement being such that the ratchet wheel is turned by one tooth each time the piston completes a stroke. Fixed to the ratchet wheel is a calibrated disc which operates a series of counters. The ratchet wheel is fixed on a spindle to which is fixed a pointer arranged to move over a dial suitably calibrated to give a desired reading. In the form described the dial is calibrated in pints and movement of the ratchet wheel by one tooth indicates a delivery of one pint of liquid. A totalisator mechanism may be combined with the meter to indicate the total quantity of liquid delivered by the device.

Dated this 8th day of November, 1946.

For the Applicants:
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Chartered Patent Agents,
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COMPLETE SPECIFICATION

A Device for Supplying a Measured Quantity of Liquid

We, SYDNEY EWART BULLOCK, of M/V Nial, Galmpton Shipyard, Galmpton-on-the-Dart, near Brixham, Devon, WILLIAM EDWARD KENDRICK, of "Glendene", Windmill Lane, Alton, Hants, and THOMAS HAMILTON FAULKNER, of 21, Wrayfield Road, North Cheam, Surrey, all British Subjects, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to a device for supplying a measured quantity of liquid and is an improvement in or modification of the invention disclosed in our Patent Specification No. 610,596 filed July 1, 1946.

In that specification we have described and claimed a device for connection to a supply of liquid under pressure for the purpose of supplying a measured quantity of the liquid comprising a chamber of predetermined capacity, a piston slidably mounted in said chamber, and manually controlled valve means for placing the two parts of the chamber on opposite sides of the piston in communication respectively with the liquid inlet and delivery outlet, and for alternately reversing these communications, wherein the delivery outlet is governed by a toggle-operated valve which is actuated by variations of pressure in the liquid passing through the device to open and close with a snap action.

The previously described device comprises, *inter alia*, an annular chamber, a piston in the annular chamber adapted to reciprocate therein under pressure from the fluid to be delivered, a valve sleeve axially disposed in the annular chamber, a tubular valve structure within the valve sleeve and having ports suitably arranged for providing communication between the supply and the annular chamber, and between the annular chamber and the interior of the valve sleeve, which acts as a transfer chamber, a control piston for the toggle operated valve, subject to pressure variations in the liquid passing through the device, means for regulating the rate of discharge of the fluid delivered by the device, and means for counting the number of measured quantities delivered.

Objects of the present invention are to simplify the tubular valve structure and the means for regulating the rate of discharge.

Further objects of the invention are to provide means for ensuring that the measured quantity is always fully delivered to the customer and to provide a visual indication of the quantity delivered.

One improvement according to the present invention consists in making the ends of the tubular valve structure in which the ports are provided of conical shape, and fitting these conical ends into valve seatings having cylindrical outer walls in fluid-tight contact with the valve sleeve, and inner walls which are tapered to correspond with the conical ends of the valves.

A spring may be provided to act on one of said valve seatings to press it on to the valve end seating therein, a fluid-tight packing being provided between the valve seating and the valve sleeve.

A further improvement according to

the present invention consists in providing means to prevent resetting of the manually controlled valve means until the required measured quantity of liquid has been delivered. These means may comprise a locking member operatively connected with the control piston of the toggle operated valve and arranged automatically to lock the tubular valve against rotation when the control piston is operated by the prevailing pressure, and to release the tubular valve when the operating pressure drops.

A further improvement according to the present invention consists in providing a modified means for regulating the rate of delivery from the outlet of the device, which regulating means according to the present invention comprise a nozzle wall having a series of apertures through which the liquid must pass to the outlet, a sleeve slidably mounted on the wall of the nozzle and manual means for moving the sleeve to uncover these apertures to a greater or less extent.

A further improvement according to the present invention consists in operating meter mechanism by a ratchet wheel actuated through suitable transmissions from two spring pressed plungers disposed respectively in opposite ends of the chamber of predetermined capacity so as to be operated alternately on the completion of the stroke of the piston mounted therein.

A device made according to the present invention is illustrated in the accompanying drawings, wherein:—

Figs. 1a and 1b together constitute a vertical longituduinal section through a modified form of device made according to the invention;

Figs. 2a, 2b and 2c together constitute a plan view of Fig. 1 with the meter cover removed;

Fig. 3 is a perspective view of the main valve structure in Fig. 1;

Figs. 4 and 5 are respectively end views of Fig. 3 looking in the directions of the arrows A and B, respectively;

Fig. 6 is a front end view of the nozzle cap;

Fig. 7 is a section on line XIIII—XIIII of Fig. 1;

Fig. 8 is a section on line XV—XV, Fig. 1;

Figs. 9 and 10 are respectively sectional views illustrating the main valve structure in the two operating positions, respectively;

Figs. 9A and 9B are respectively transverse sections taken respectively on lines A—A and B—B, Fig. 9.

Figs. 10C and 10D are respectively transverse sections taken respectively on lines C—C and D—D Fig. 10, and

Fig. 11 is a plan view of the meter dial.

The apparatus shown in the drawings (see Figs. 1a and 1b) comprises a cylindrical shell-like casing 100 fitted with front and back end caps 101, 102, a front nozzle part 103 connected to the front end cap 101 by a ring 104, a valve sleeve 105 disposed axially in the casing 100, a piston 106 arranged to reciprocate in the annular chamber 107 between the sleeve 105 and casing 100, a tubular valve structure 108 disposed axially inside the sleeve 105, and a handle 109 secured to an extension 110 of the valve structure 108, which extension projects beyond the end of the casing 100, the handle serving for rotating the valve structure 108 to bring valve inlet and outlet ports therein respectively into and out of alignment with ports 111, 112 in the valve sleeve 105.

The tubular valve structure 108 is made of steel and comprises an intermediate part of reduced diameter and two conical end parts 113, 114 of larger diameter. The front valve part 113 (Fig. 1a) seats in a bronze seating 115 having a cylindrical outer surface but suitably tapered internally to receive the valve, and force fitted into the front end of the valve sleeve 105 to obtain a fluid tight joint between the seating and the sleeve. The valve part 113 has two ports 116, 117 separated angularly by 120°, the port 116 communicating with a chamber 122 hereafter described.

The rear valve part 114 (Fig. 1b) is similarly shaped to the front valve part and likewise has two ports, namely, a port 118 at the end of an inlet passage 119, and a port 120, the two ports being separated angularly by 120°. In addition the rear valve part 114 has one or more passages 121 (these passages are shown in Figs 3 and 5) providing communication between the inlet passage 119 and a chamber 122 formed between the walls of the sleeve 105 and the valve structure 108 and referred to hereafter as the "sleeve chamber", this communication being established in both operative positions of the valve structure. The rear valve 114 also seats in a bronze seating 123 suitably tapered internally to receive the valve. For the purpose of assembly and to allow for taking up wear the rear seating 123 is fitted in the valve sleeve in the following manner. After insertion of the valve structure 108 through the rear end of the sleeve 105, the seating 123 is slidden into the sleeve 105 over the valve 114, with which it has a sliding fit. An annular depression 124 is provided

around the seating 123 and an oil retaining packing ring 125 is next slipped over the seating into the depression 124, the ring 125 being narrower than the depression. An annular distance ring 126 is next inserted so as to bear against the ring 125, the distance ring 126 having an aperture 127 to register with the port 111 in the sleeve 105. A second similar packing ring 128 is now inserted followed by a gland nut 129 which is screwed on to a rear extension 130 of the seating 123 to compress the packing rings 125, 128. The gland nut 129 is formed on its rear surface with a castellated ring 131, to receive a projection 132 carried on a locking ring 133, the projection 132 extending also radially to engage a slot 134 in the sleeve 105.

The seatings 115, 123 are formed respectively with ports aligned with the ports 112, 111 in the valve sleeve 105.

The bore of the locking ring 133 is formed with two oppositely disposed flats 135, 135¹ arranged to slide on corresponding flats 136, 136¹ on the smooth end of the seating 123 so as to prevent relative rotation between the ring and the seating. The arrangement thus effectively locks the seating 123 against relative rotation between the sleeve 105 and seating whilst permitting relative sliding movement between the seating assembly and the sleeve 105. A relatively powerful spring 137 bears between the end cap 102 of the casing 100 and the locking ring 133 and serves to press the seating assembly into fluid tight contact with the valve 114. The flexible mounting of the seating 123 thus allows for taking up wear.

The front nozzle part 103 (see Fig. 1a) comprises a cylindrical casing 138 screwed at its rear end to the ring 104 and at its front end to a nosepiece 139 having a central outlet 140. The rear end of the casing 138 has an internal screw thread 141 engaged by a correspondingly screwed flange 142 of a sleeve 143, the front end of which has a screw connection 144 with a nozzle member 145 in such a way as to form a chamber 146 between the rear end of enlarged diameter of the nozzle 145 and the skirt portion 147 of a piston 148, a spring 149 being disposed in the chamber 146 and bearing forwardly on the rear surface of the nozzle member 145 and rearwardly on the skirt 147 of the piston 148. The latter has two oppositely disposed slots, 150, 150¹ in which the ends of two toggle springs 151, 152 are respectively connected, the other ends of the toggles being connected to a plunger 153 slidably mounted in borings in the nozzle member 145 and in the skirt 147 of piston 148 and constituting a valve controlling the opening and closing of the nozzle outlet 154.

Communication between the spring chamber 146 and atmosphere is permanently provided by a passage 155 drilled in the nozzle member 145 and in permanent communication with atmosphere through an outlet 156 drilled in the wall of the nose piece 139. This passage 155 serves to allow air in the chamber 146 to be exhausted readily to atmosphere when the piston 148 moves forwardly under built-up pressure.

The piston 148 has an axial extension 157 projecting through a chamber 158 formed between the piston 148 and the valve part 113. This extension has an upstanding foot 159 against which bears one arm of a pivoted bell crank lever 160 pressed by a spring 161. When the piston 148 moves forwardly under pressure built up in the chamber 158 the lever 160 is moved against the action of its spring and its free arm enters a slot 162 in a flange 163 screwed into the front end of the valve part 113, in which position it is locked by a locking screw, (not shown) thus preventing subsequent rotation of the valve structure 105 to re-set the valve ports until the built-up pressure drops, which only takes place when the full measured quantity has been delivered. When the pressure drops the piston 148 is returned by the spring 149 and the arm of the lever 160 is withdrawn from the slot 162 under the action of its spring 161.

The means provided for varying the rate of delivery comprise one or more apertures (six in the form shown) 164 drilled in the wall of the nozzle 145 near the front end thereof and a sleeve 165 slidable along the nozzle to cover or uncover the aperture or apertures 164 more or less to vary the rate of flow of the liquid passing from a chamber 166 surrounding the nozzle to the outlet 154. The position of the sleeve 165 is adjusted as required by a lever 166 having a forked end 167 surrounding the nozzle casing 138 and fixed to a spindle 168 rotatably mounted transversely of the casing, and a forked member 169 fixed to the spindle 168 inside the casing and carrying pins 170 engaging respectively in opposite sides of a groove 171 in the sleeve 165. The arrangement is such that depression of the lever 166 rotates the spindle 168 which rocks the forked member 169 and moves the sleeve 165 back against the action of a spring 172 to uncover more or less the aperture or apertures 164. When the lever 166 is released the spring 172 returns the sleeve 165 to a position in which it can completely close the opening or openings 164,

or to a position in which the opening or openings 164 is or are closed to a maximum extent.

The handle 109 (see Fig. 1b) has an aperture 173 by means of which it is passed over the extension 110 of the tubular valve structure 108 the handle being secured to the extension by a locking nut 174 screwed on to the end of the extension 110. The handle has a boring 175 to provide an inlet for the liquid to be dispensed, and a screw thread 176 at the end of the boring 175 for connection to a flexible hose, the other end of which is connected to a supply of the liquid under pressure to be dispensed. The wall of the valve extension 110 is drilled with an aperature 177 to afford communication between the bore 175 and the inlet passage 119 of the valve structure 108.

The piston 106 is arranged to actuate the mechanism of a meter 178 for indicating the quantity of liquid sold to a customer. This meter may also include totalising mechanism 179 for indicating the total amount of liquid dispensed by the device. For the purpose of operating the meter mechanism two spring pressed plungers 180, 181 (Figs. 2 and 2a) are arranged to project respectively into opposite ends of the chamber 107, leakage from the chamber as a result of the plungers penetrating therein being prevented by leather oil seals 182, 183. The transmission between each plunger and the meter mechanism is similar. Each transmission comprises a lever 184 pivoted at 185, the lower end of the lever 184 being operable by a plunger 180 or 181 and the upper end of the lever being connected to a push rod 186 slidably mounted in a tube 186¹ outside and parallel with the casing 100, and projecting into the casing of the meter 178. The push rod 186 actuates a block 187 slidingly mounted in slots 188 in the base plate of the meter casing, which block carries a spring loaded pawl 189 pressed by its spring into engagement with a tooth on a ratchet wheel 190 having eight such teeth, the two sliding blocks 187 of the two transmissions operating in opposite directions so that each working stroke of each block rotates the ratchet wheel 190 by one tooth. Return springs 191, 192 and 193 are provided to return the parts 184, 186 and 187 respectively after they have been actuated. The arrangement, therefore, is such that as the piston 106 reaches the end of a stroke it strikes the corresponding plunger 180 or 181, which actuates the associated transmission to turn the ratchet wheel 190 by one tooth. The ratchet wheel 190 is rotatably mounted (see Fig. 1b) on the lower part 194 of a spindle comprising two parts 194, 195 screwed into one another, and drives the pointer 196 in one direction only through a clutch comprising an expanded spring ring 197 fixed to the ratchet wheel 190 so as to expand inside a sleeve 198 fixed to the pointer 196. This sleeve 198 is rotatably mounted on the upper spindle part 195 and is arranged to be driven in one direction only, i.e. the opposite direction to that in which it is driven by the ratchet wheel, by a zero setting knob 199 through a unidirectional clutch comprising teeth 200 on the outer surface of the sleeve 198 engaged by a spring pressed pawl 201 fixed to the knob 199, the zero setting movement being limited by a spring pressed pawl 202 arranged to ride over the periphery of a disc 203 fixed to the sleeve 198 until it is arrested by butting against a stop 204 on the disc 203. The ratchet wheel 190 is located after each turning movement by a spring loaded locating plunger 205 arranged to engage the teeth of the ratchet wheel. The pointer 196 moves over a calibrated circular dial 206 bearing the markings 0—7 respectively, in equi-angular relationship, these markings in the present case representing pints, for example of lubricating oil. The totalising mechanism 179 is operated by a disc 207 fixed on the ratchet spindle 194 and having a single tooth 208 which turns the units wheel 209 of the totalising mechanism by one tooth for each complete revolution of the ratchet wheel 190. The tens and hundreds wheels 210, 211, respectively, of the totalising mechanism are turned by similar single-tooth discs 212, 213 on the units and tens wheels respectively to denote totals of tens and hundreds of gallons. The pointer 196 thus indicates any one sale up to eight pints or one gallon, which is a greater quantity than is normally supplied in any one sales operation direct into a motor car engine, and, in addition, the total sales are also recorded. After a sales operation the pointer 196 is reset to zero by rotating the knob 199 fixed to the ratchet spindle.

The operation of the device will be described in connection with its use for delivering measured quantities of lubricating oil into the engines of automobiles, aircraft and the like, the chamber 107 being designed in this particular case to deliver one pint of lubricating oil on each stroke of the piston 106. The apparatus is installed as above described by screwing a flexible hose of suitable length to provide for limited mobility on to the screw thread 176 of handle 109, and the oil in the supply tank is placed under pressure by means of compressed air sup-

plied to the tank through a reducing valve adjusted to maintain a pressure of 35—40 lbs. per sq. inch.

When the instrument is first installed it must be primed before use in order to expel all air, and this is carried out in the following manner.

In Figs. 1 and 1a the valve structure is shown in a neutral position, but assuming control handle 109 is in the extreme anti-clockwise position (Fig. 10) when the device was connected, it is now turned clockwise through 120° this being the full amount of its rotation. As a result of this rotation the positions of the various ports and passages in the valve structure 108 are moved from the positions shown in Fig. 10 to the positions shown in Fig. 9 in which figure the oil flow is indicated by arrows. As indicated by the arrows, oil under pressure flows through inlet passage 119, port 121, chamber 122, and ports 116, 112 to the left hand side of piston 106 (as viewed on the drawing) and the piston 106 moves to the right, compressing the air in chamber 107 on the right hand side of the piston 106, which is discharged through the ports 111, and 120 and passes into the chamber 158. Pressure is thus built-up in the chamber 158 and this pressure acts on the piston 148 to move it forwardly against the spring 149, whereby the outer ends of the toggle springs 151, 152 are moved from the position shown in Fig. 1 to the left beyond the dead centre position. In this way the pressure of the toggle springs previously exerted to close the valve 153 against the nozzle outlet 154 is now exerted to move the valve suddenly rearwardly to uncover the outlet 154 and thus permit a measured volume (normally of oil, but in the priming action, air or a mixture of oil and air), to pass out through the nozzle outlet 154. When the measured quantity has been discharged the pressure in the chamber 158 drops suddenly with the result that the piston 148, and with it the toggle springs 151, 152, is returned by the spring 194 to the position shown in Fig. 1, whereby the valve 153 is applied with a snap action again to seal the outlet 154. When the piston 106 reaches the end of its travel, the chamber 107 is full of oil, and the handle 109 is now turned anti-clockwise through an angle of 120°, changing the valve ports and passages from the positions shown in Fig. 9 to the positions shown in Fig. 10.

In the new positions of the valve ports and passages oil entering the device through the inlet passage 119 passes through the port 111, into the chamber 107 on the right of the piston 106 as shown by the full line arrows. The piston 106 now moves to the left, expelling through the ports 112, 117 the oil previously drawn (as shown by full line arrows (Fig. 10)) into the chamber 158 where the valve 153 is again operated to discharge it. The chamber 107 on the right hand side of piston 106 is now full of oil. The above two operations should be again repeated to ensure that no air is trapped in any part of the device, and the device is then ready for use.

In subsequent use the operation is similar to that above described, but oil is now delivered instead of air or a mixture of oil and air, the handle being turned alternately clockwise and anti-clockwise for successive deliveries. Each time the handle is turned a fresh charge of oil is drawn into the chamber 107 at the end in which the piston 106 is disposed; the pressure of the incoming oil is greater than that of the measured quantity on the opposite side of the piston with the result that the piston is moved to the opposite end of its stroke, expelling the measured quantity of oil through the corresponding valve ports into the chamber 158 from which the flow is restricted as described and consequently the necessary pressure is built up to operate the piston valve 153 to discharge the oil. The pressure is maintained in the chamber 158 until the whole of the measured quantity has passed into the nozzle chamber 166 whereupon the pressure drops and the valve 153 is automatically returned by the spring 149 to close the nozzle outlet, 154.

It should be noted that the sleeve chamber 122 is always full of oil at the pressure prevailing in the supply tank and exerts an equal pressure on each of the conical valve ends 113, 114.

As above described the rate of flow from the nozzle outlet can be controlled by the manually operated sleeve valve 165. Shallow slots may be machined in the front face of the sleeve to ensure, if desired, that the apertures 164 always remain slightly uncovered so that the flow cannot be entirely arrested.

Once the handle 109 has been turned to deliver a measured quantity it cannot be again operated until the full measured quantity has been delivered, by reason of the pivoted locking lever 160 above described, which prevents subsequent rotation of the valve structure until the pressure in the chamber 158 drops sufficiently to allow the piston 148 to withdraw the locking lever 160 from the slot 162 in the valve seating 113.

It has been found with an experimental model of the device described that the measured quantity can be delivered in a very short time, about 4 seconds and a

device according to the invention ensures that oil (or other liquid) is delivered in the condition in which it is in the storage tank, i.e. it is delivered free from dirt or other foreign matter such as may be present in the case of open containers into which a measured quantity is poured, which can be left lying about the premises exposed to contamination of many kinds.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. The improvement in, or modification of, the invention described and claimed in Patent Specification No. 610,596 which consists in making the ends of the tubular valve structure in which the ports are provided of conical shape and fitting these conical ends into valve seatings having cylindrical outer walls in fluid-tight contact with the valve sleeve, and inner walls which are tapered to correspond with the conical ends of the valves.

2. A device according to claim 1 wherein a spring is provided to act on one of said valve seatings to press it on to the valve end seating therein, a fluid-tight packing being provided between the valve seating and the valve sleeve.

3. The improvement in, or modification of the invention described and claimed in Patent Specification No. 610,596, which consists in providing means to prevent resetting of the manually controlled valve means until the required measured quantity of liquid has been delivered.

4. A device according to claim 3 wherein said means comprise a locking member operatively connected with the control piston of the toggle operated valve and arranged automatically to lock the tubular valve against rotation when the control piston is operated by the prevailing pressure, and to release the tubular valve when the operating pressure drops.

5. The improvement in, or modification of, the invention described and claimed in Patent Specification No. 610,596 which consists in providing means for regulating the rate of delivery from the outlet of the device comprising a nozzle wall having a series of apertures through which the liquid must pass to the outlet, a sleeve slidably mounted on the wall of the nozzle and manual means for moving the sleeve to uncover these apertures to a greater or less extent.

6. The improvement in, or modification of the invention described and claimed in Patent Specification No. 610,596 which consists in operating meter mechanism by a ratchet wheel actuated through suitable transmissions from two spring pressed plungers disposed respectively in opposite ends of the chamber of predetermined capacity so as to be operated alternately on the completion of the stroke of the piston mounted therein.

7. Apparatus for delivering measured quantities of liquid under pressure constructed, arranged and adapted to operate substantially as described with reference to and as illustrated in the accompanying drawings.

Dated this 15th day of August, 1947.

For the Applicants:
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Chartered Patent Agents,
65, Victoria Street, London, S.W.1.

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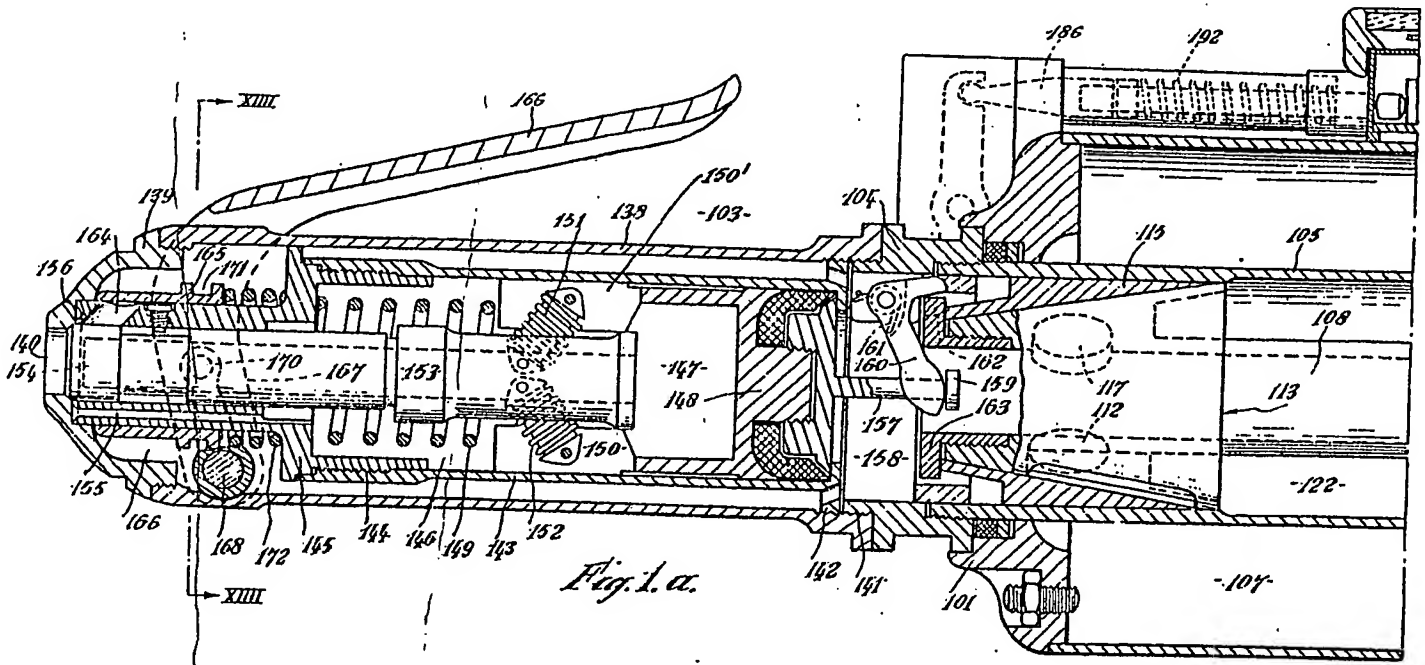

Fig. 1. a.

625,698 COMPLETE SPECIFICATION

SHEET 1

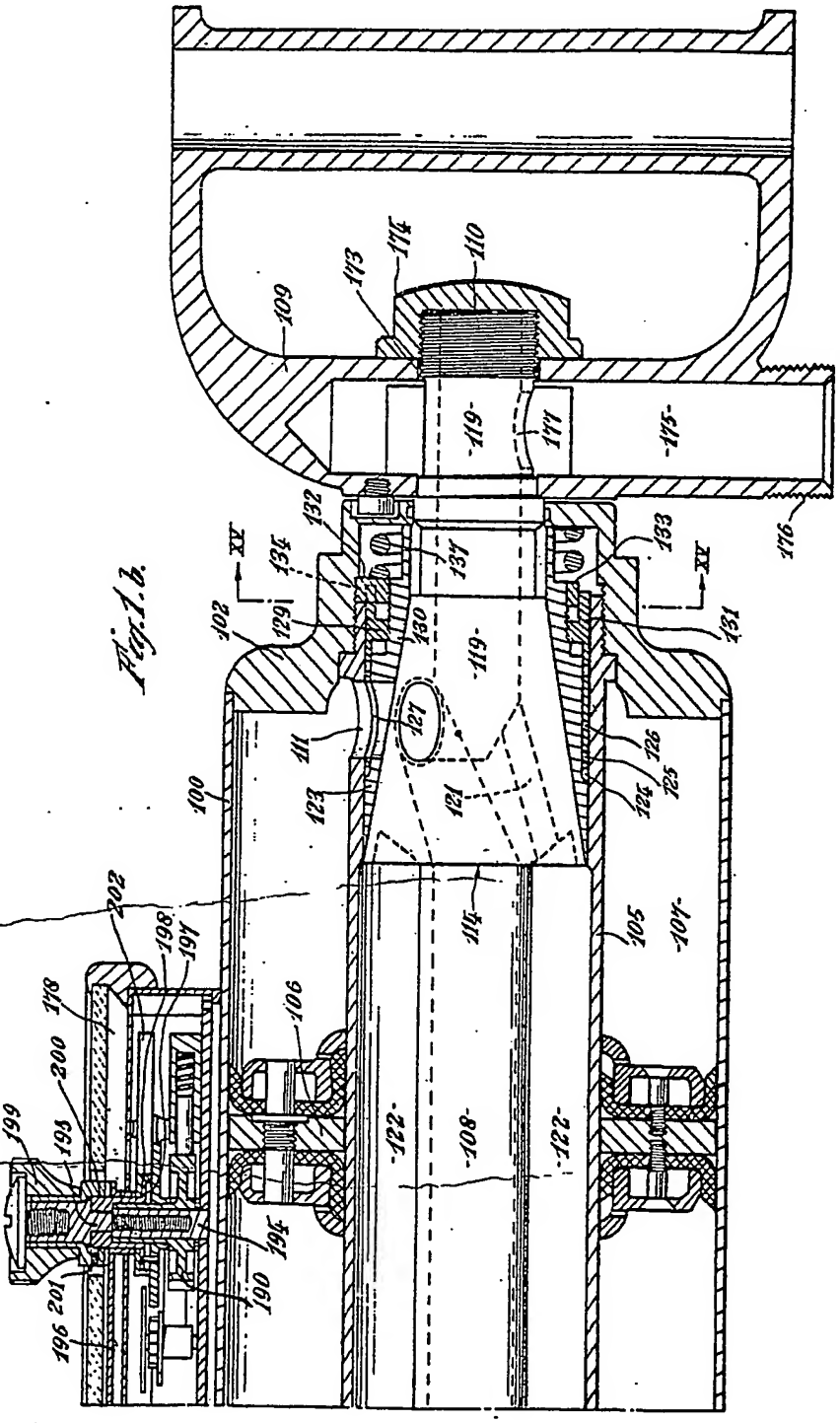

Fig. 1. b.

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625,698 COMPLETE SPECIFICATION

SHEET 1

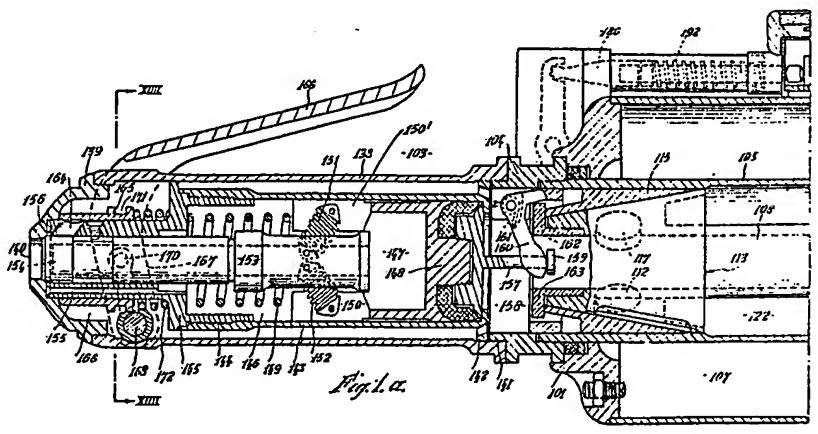

Fig. 1. a.

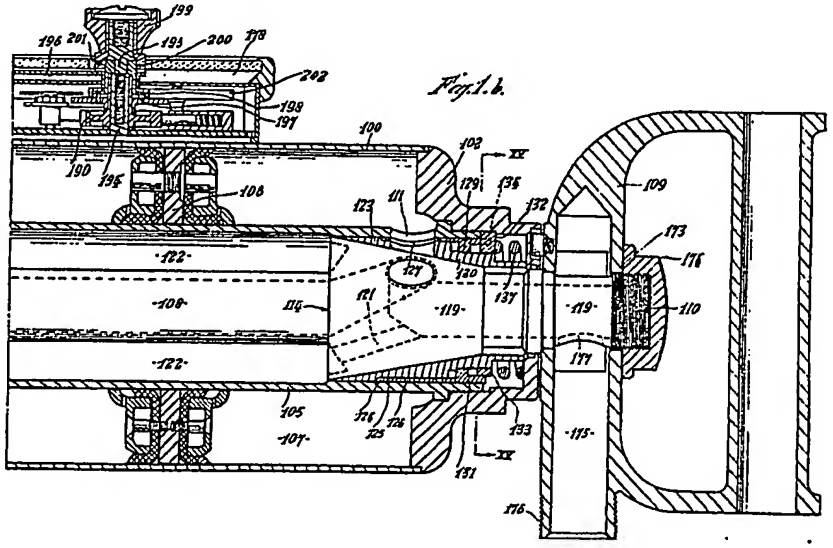

Fig. 1. b.

H.M.S.

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Fig. 2.a.

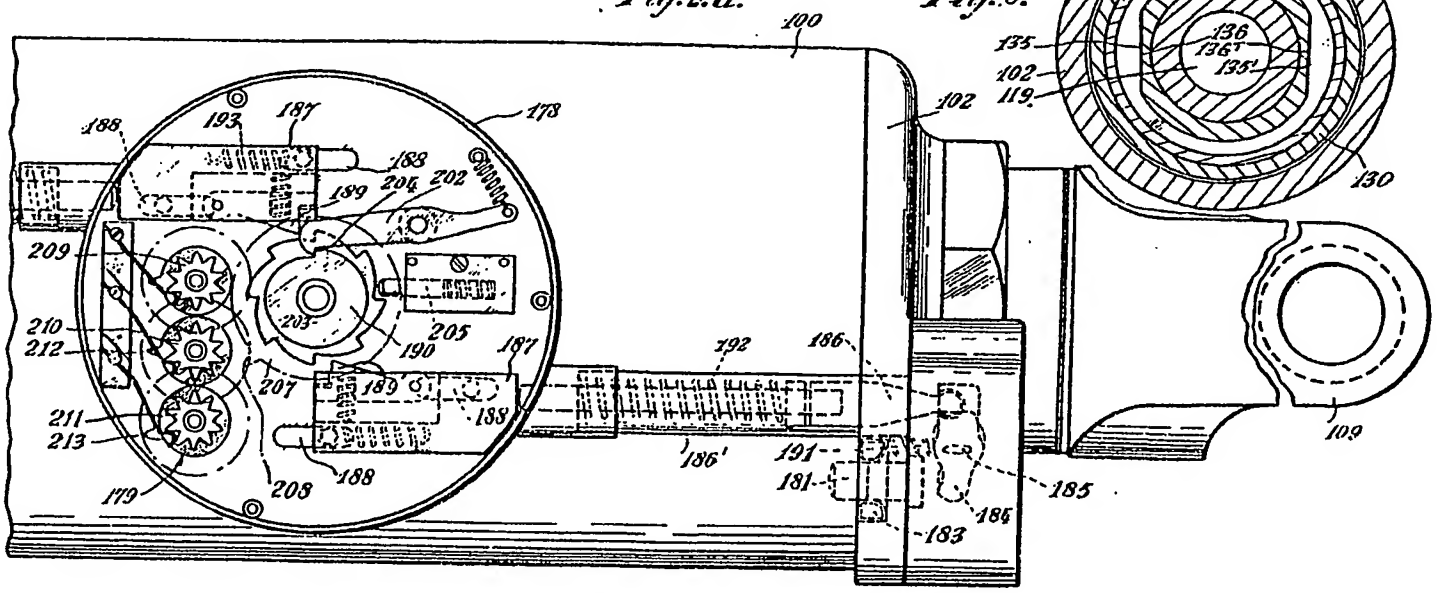


Fig. 8.

SHT.

Fig. 2c.

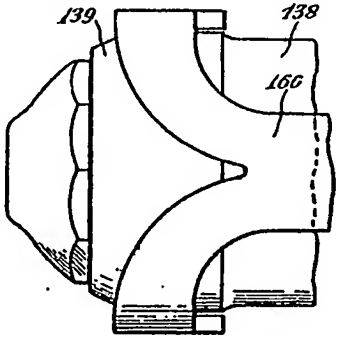


Fig. 2b.

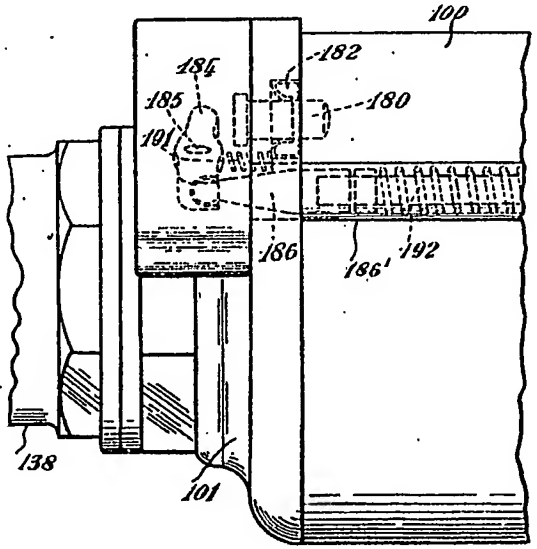
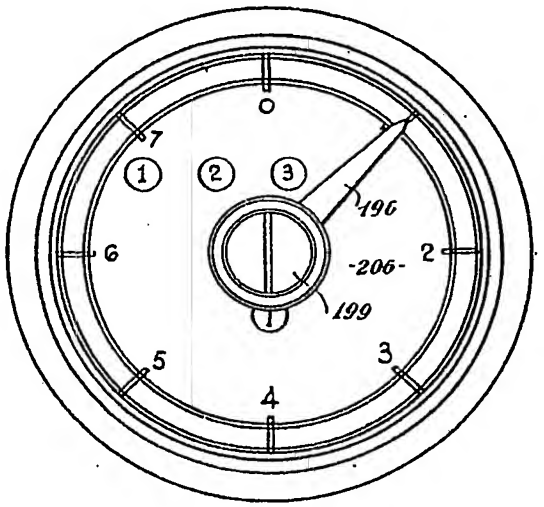


Fig. 11.



H.M.S.O.(Ty.P.)

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SHEET 3

Fig. 2a.

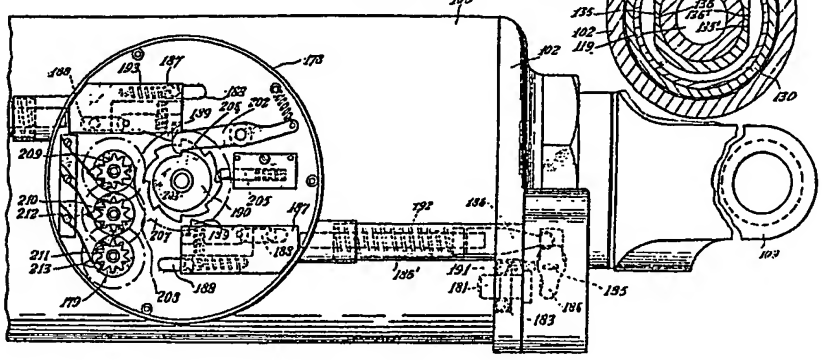


Fig. 8.

Fig. 2c.

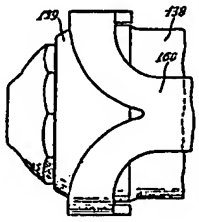


Fig. 2b.

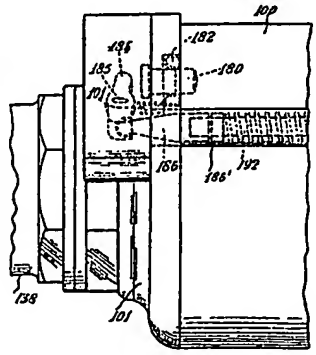
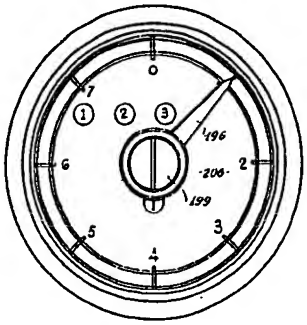


Fig. 11.



H.M.S.O.(17)

SHEET 3

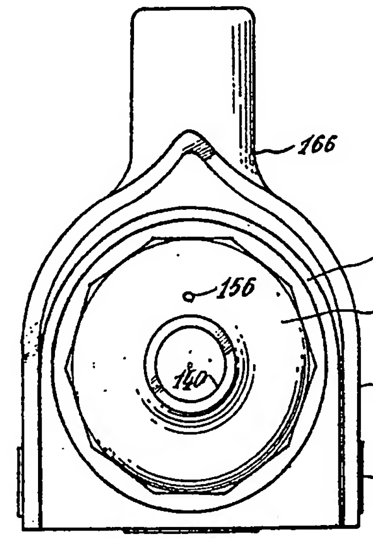


Fig. 6.

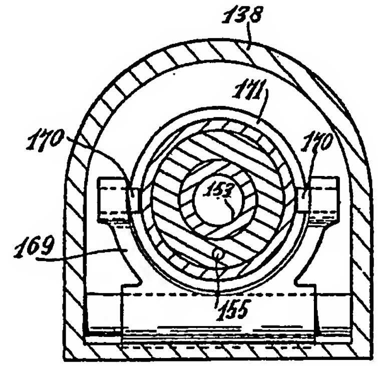


Fig. 7.

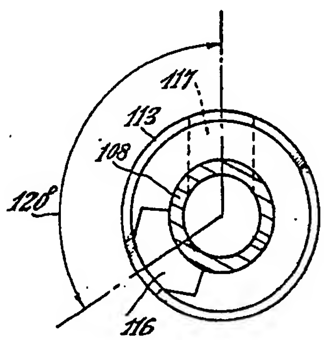


Fig. 4.

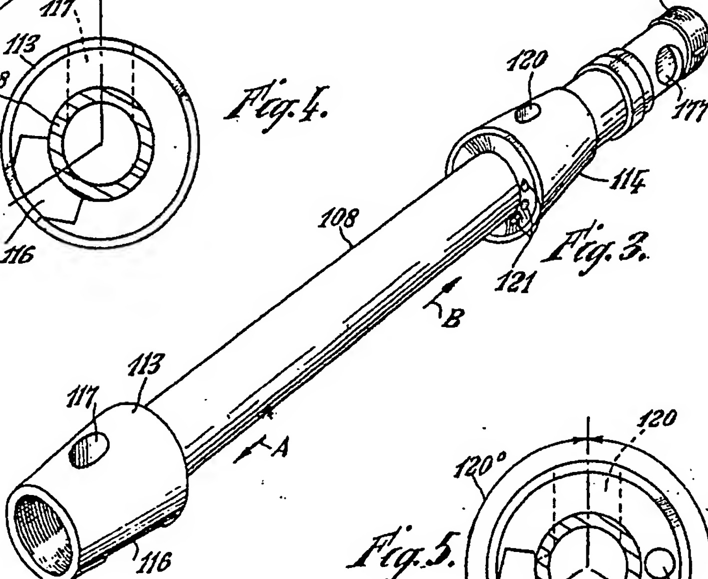


Fig. 3.

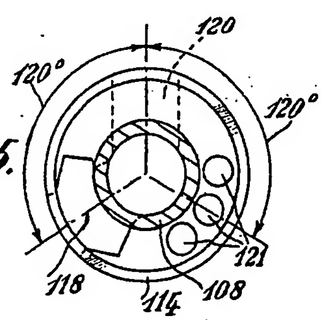


Fig. 5.

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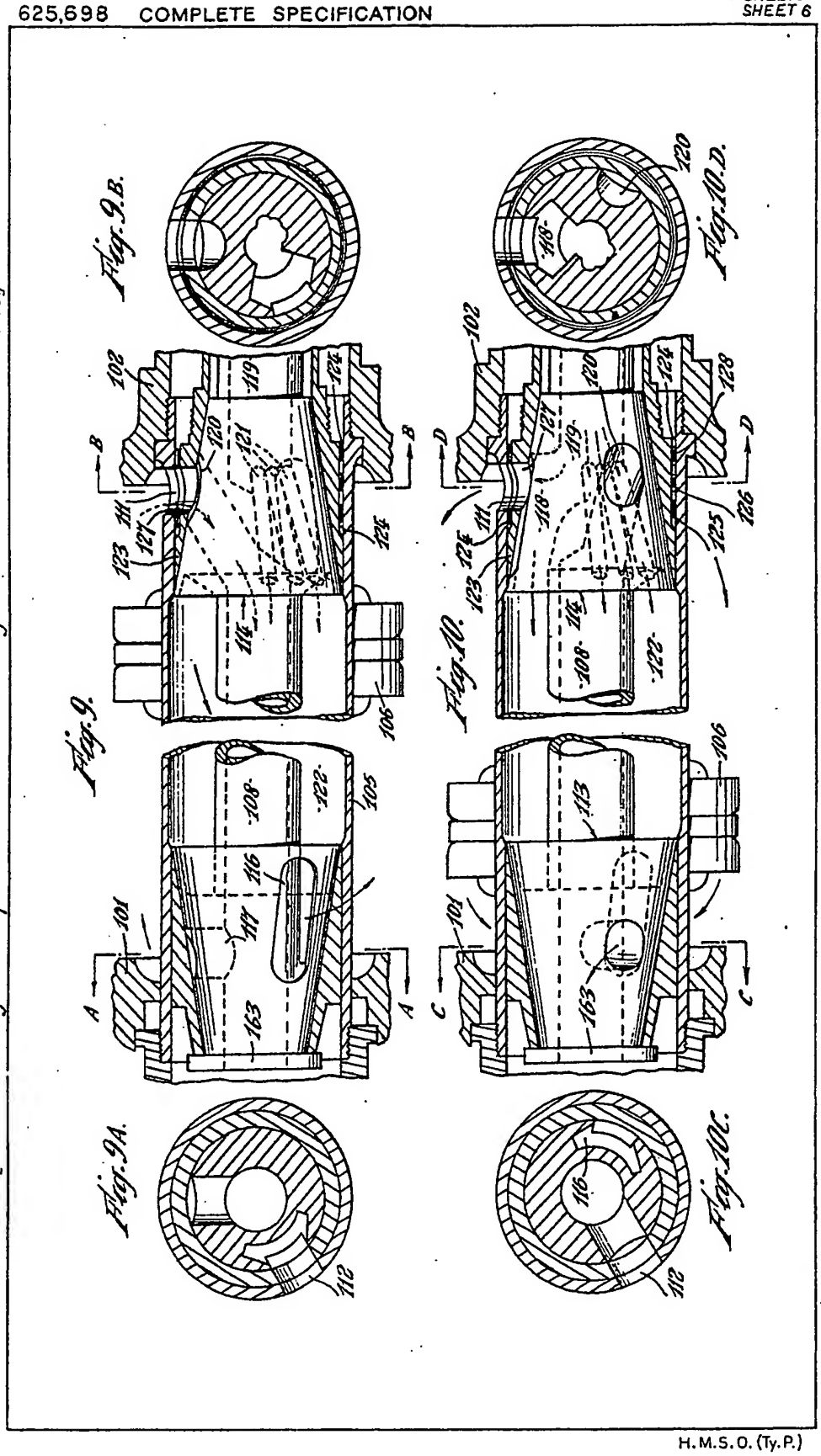

H.M.S.O. (Ty.P.)